dCS Vivaldi DAC

Stereo Digital to Analogue Converter

User Manual

Software Release 1.2x

December 2015

This product incorporates the following ***dCS*** proprietary technology:

Ring DAC™

© Data Conversion Systems Ltd. 2012-2015 **Price UK £10.00**

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Contents

Using the *dCS* Vivaldi DAC for the first time **5**
What's in the box? 5
Positioning the unit 5
Safety Notice 6

Step-by-Step Guide **7**
Preliminaries 7
Fitting the Remote Control handset batteries 8
STEP 1 – Connecting a PCM Input 9
Connecting to a Dual AES Source 9
Connecting to a Single AES or SPDIF source 10
Connecting to an SDIF/DSD Source 10
STEP 2 – Setting up the USB source 11
Compatibility 11
Connecting the USB interface 11
Loading the Windows driver for USB Class 2 11
Basic setup with a PC 12
A word about Music Playing Software 12
Selecting the Vivaldi DAC as your Audio Output device 13
STEP 3 – Connecting the Analogue Outputs 14
STEP 4 - Setting the Output Level 14
STEP 5 – Choosing a Sync Mode 15
Using the DAC's AES & SPDIF inputs in Master Mode 15
Using a Master Clock in a CD/SACD system 16
A full Vivaldi system 17
Advanced options 19
Customising the input configuration 19

Front Panel **20**
Remote Control Receiver 20
Display 20
Power Button 21
Menu Button 21
Filter Button 21
Input button 22
Mute Button 22
Rotary Control 22

Rear Panel **23**
Analogue Outputs 23
AES Digital Inputs 23
SPDIF Digital Inputs 24
SDIF-2 Digital Interface 24
USB Interface 24
Word Clock Inputs and Output 25
Test interface 25
Mains inlet 25
Label 25

Remote Control **26**

The Menu **27**
Using the Menu 28
INFORMATION Menu 29
Unit Status 29
Version 29
Contact 29
Update 29

SETTINGS Menu 30
Sync Mode 30
Output Level 30
Dual AES1+2 31
Dual AES3+4 31
Phase 31
Channel Swap 31
Balance 31
USB Class 31
Buffer 32
EasyPlay 32
RS232 Mode 32
CONFIGURATION Menu 33
Settings Lock 33
Save Configuration 33
Restore Configuration 33
Reset Input Names 33
Factory Reset 33
DISPLAY SETTINGS Menu 34
Brightness 34
Display On/Off 34
GENERATOR Menu 34
Channel Check 34
Phase Check 34
Burn In 34

Specification 35

Maintenance and Support 37

Service and Maintenance 37
Replacing a Blown Mains Fuse 37
Cleaning the case 37
Limited Warranty 38
If you need more help 39
Software History 39

Index 40

USING THE *dCS* VIVALDI DAC FOR THE FIRST TIME

Congratulations on purchasing your ***dCS*** Vivaldi DAC.

Before using your unit, please read this section and the Step by Step Guide. This will enable you to set the unit up quickly and safely with your hi-fi system.

From time to time, ***dCS*** will release updated software on CD that you can install yourself using the Update feature. Please check our web-site occasionally to see if new Vivaldi DAC software is available, or consult your dealer.

What's in the box?

Check that the box contains the following items:

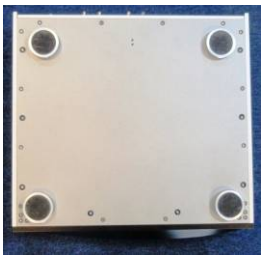
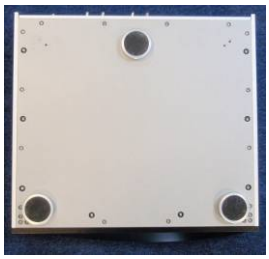
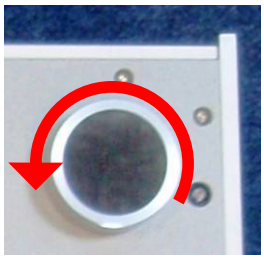
- ***dCS*** Vivaldi DAC
- Manual and Menu / Setup Guide
- Power cable
- 2 AES/EBU cables
- BNC cable
- USB cable
- 2 spare fuses
- ***dCS*** Premium Remote Control Handset with 2x AAA batteries

Notify your dealer as soon as possible if anything is missing or damaged. We suggest that you retain the original packaging for possible future use. If this is not possible, replacement packaging can be ordered from ***dCS*** or our distributors. Details can be found on our web site at www.dcsltd.co.uk.

Positioning the unit

For best sound quality, the units in the Vivaldi range are designed to be mounted on separate shelves of a rack, although they may be stacked directly on top of each other if this is absolutely necessary. Place each unit on a firm, vibration free base, allowing convenient connection to the other parts of your system. To prevent overheating, we recommend that you leave some free space around the unit to allow for ventilation.

The unit is supplied with 4 feet fitted. If you prefer a 3-feet layout, unscrew the two back feet, remove the two black cores using a 2.5mm A/F Allen key, fit one of the cores in the middle position and replace the foot. Take care not to cross-thread the foot!

With all feet screwed fully home, the unit will sit level on a flat surface. If you need to do any levelling, you can unscrew any of the feet up to 3 complete turns, to give up to 3mm (1/8") of height adjustment.

Safety Notice

Your ***dCS*** Vivaldi DAC contains no user serviceable parts. **DO NOT** attempt to open the case as there are potentially dangerous voltages present inside. In the event of the unit developing a fault, please contact your dealer in the first instance.

If you decide to remove safety covers for any reason, disconnect the power cable first.

To maintain protection from electric shock, the unit MUST be connected to mains earth (ground) via the power cable. Also, unearthed systems do not give the best sonic performance.

Protect the product from dripping or splashing liquids. Liquid-filled objects such as vases must not be placed on the product.

This product is lead-free and complies with the RoHS directive.

Before connecting the power cable to the unit for the first time, please check that it has been set to the correct operating voltage for your mains supply. The unit's voltage setting is shown on the serial number label. If this does not match your local supply voltage, DO NOT attempt to use the unit. Contact your dealer to have the unit reset. Using the unit with the wrong mains setting for your local supply may result in serious damage to the unit and will invalidate the warranty. Do not attempt to reset the voltage yourself.

We do not recommend the use of mains regenerators. However, if you do wish to use a mains regenerator with variable voltage and frequency, we recommend that you set the voltage to match your local voltage and the frequency to either 50Hz or 60Hz ONLY.

Damage caused to your Vivaldi DAC by misuse of a mains regenerator or by a malfunctioning mains regenerator is not covered by the warranty.

Disposal at end-of-life: the symbol indicates that this product should not be treated as normal household waste. It should be recycled, so please take it to an approved collection facility.

STEP-BY-STEP GUIDE

This section guides you through setting up the unit for basic operation.

Preliminaries

The Menu Guide sheet details the menu structure.

For digital interfaces, use with cables designed for digital audio:

- for AES/EBU interfaces use 110Ω screened, twisted pair cables fitted with one male XLR connector and one female XLR connector.
- for SDIF-2, Word Clock or SPDIF BNC interfaces, use 75Ω coax cables fitted with BNC plugs.

SDIF-2 and Word Clock interfaces require a simple DC-coupled connection. The interfaces may malfunction or not work at all if capacitor coupled cables or cables with built-in networks are used.

- for SPDIF RCA interfaces, use 75Ω coax cables fitted with RCA Phono plugs.
- for TOSLINK optical interfaces, use Toslink fibre-optic cables.
- for the USB interface, use a standard USB2.0 cable fitted with one type A and one type B connector. The internal screen must be connected at both ends.

For analogue outputs, use with screened cables of the correct type:

- for balanced outputs, use screened, twisted pair cables fitted with one male XLR connector and one female XLR connector.
- for unbalanced outputs, use coax cables fitted with RCA Phono plugs.

Connect the power cable to the power inlet on the DAC rear panel, plug the other end into a convenient power outlet.

Please do not use an excessively heavy or inflexible power cable as this may damage the power inlet connector.

The cables supplied with the unit are “commercial grade”, because most owners will have their own “audiophile grade” cables or will prefer to make their own cable choices.

Press the **Power** button – the unit will display **Vivaldi DAC**. Wait about 30 seconds while the DAC configures itself.

If the unit is likely to be set in an unfamiliar state, you can run the Factory Reset routine by pressing the buttons in this sequence: **Menu, ►, ►, Menu, ◄, ◄, Menu.**

Wait a few seconds while the unit resets itself.

Fitting the Remote Control handset batteries

Use a small coin to release the screw securing the back plate.	Lift the screw a little and slide the back plate off.	Fit 2 AA size batteries by pressing the flat end (-) against the spring and pressing the battery into the slot, so that the + end makes contact with the stud.	Slide the back plate into place and tighten the screw.

If the remote control does not appear to work after fitting the batteries, make sure that the batteries are fitted the correct way, as shown above. If in doubt, please ask your dealer for advice.

Failure to fit the batteries correctly can damage your Remote Control. Such damage is not covered by the warranty.

Please dispose of used batteries properly at a waste disposal site, not in the household waste.

STEP 1 – Connecting a PCM Input

If you want to use the USB input only, go to Step 2.

Switch on the source equipment. If appropriate, load a disk / tape and set the machine in PLAY mode to ensure it is generating a digital audio data stream.

Choose one or more of the following sections:

Connecting to a Dual AES Source

- Check that your source equipment (probably a *dCS* SACD Transport or a *dCS* Upsampler) is capable of Dual AES operation and is set up correctly.
- Connect the AES1 (or AES A) output on your source equipment to the **AES1** input on the *DAC* rear panel and the AES2 (or AES B) output to the **AES2** input, using two XLR cables. Ensure the cables are not swapped.
- Press the **Input** button repeatedly until **AES1+2** is displayed.

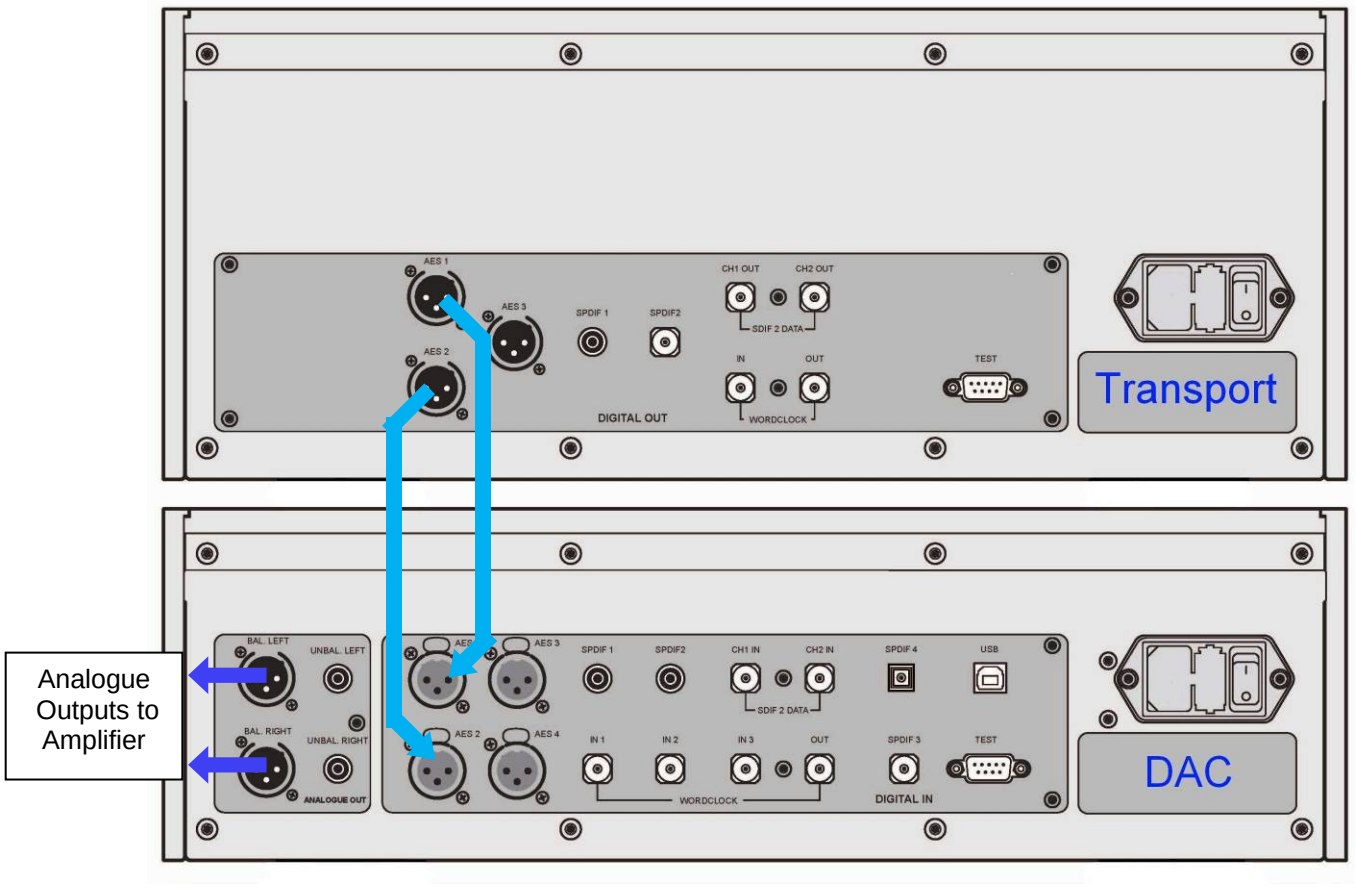


Figure 1 – Using the Vivaldi Transport with the DAC

The DAC will lock to the source, displaying **24/352.8** for example, if the source is generating 24 bit data at 352.8kS/s.

The Vivaldi DAC has a second Dual AES input on **AES3** and **AES4**. You can connect a second Dual AES source to these inputs and use the **Input** button to select **AES3+4**.

The most common set-up is to connect a Vivaldi Transport to **AES1+2** and a Vivaldi Upsampler to **AES3+4**.

Connecting to a Single AES or SPDIF source

Most source equipment (such as CD transports, DVD players) is fitted with a single wire digital output, usually on an RCA phono connector.

- Connect your source equipment to the matching input on the DAC rear panel using a suitable cable.
- Press the **Input** button repeatedly until your chosen input is displayed. This will be either **AES1, AES2, AES3, AES4, SPDIF1 (RCA), SPDIF2 (RCA), SPDIF3 (BNC),** or **Toslink**.

The DAC will lock to the source, displaying **16/44.1** for example, if the source is a CD player.

Connecting to an SDIF/DSD Source

Check that your source equipment is capable of SDIF PCM or DSD operation.

SDIF (**S**ony **D**igital **I**nter**F**ace) is not the same as SPDIF (**S**ony/**P**hilips **D**igital **I**nter**F**ace) and the two are not compatible.
Please ensure that you connect to the correct BNC sockets.

- Connect the CH1 output on your source equipment to the **CH1** input on the DAC rear panel and the CH2 output to the **CH2** input, using two BNC cables. Connect the word clock output on your source equipment to one of the **Word Clock In**put connectors on the DAC rear panel.
- Ensure the cables are not swapped.
- Press the **Input** button repeatedly until **SDIF-2** appears on the display.

Set the Settings > Sync Mode menu page to Word Clock 1, 2 or 3 as appropriate.

PCM or DSD mode is automatically detected. The DAC will lock to the source, displaying **16/44.1** for example, if the source is a CD player. **DSD** is displayed if the source is sending DSD data.

STEP 2 – Setting up the USB source

If you do not want to use a USB source, go to STEP 3.

Compatibility

The USB interface can be connected to Windows™ 8.1, Windows™ 7, Windows™ Vista (SP2), Windows™ XP (SP3) PC, Mac™ OSX (10.5.4 or later) systems or a sound server, running software to stream PCM data.

The interface should work with Linux Ubuntu servers and computers fitted with USB 2.0 interfaces that natively support USB Audio Class 1 or Class 2 operation, but this has not been extensively tested.

Connecting the USB interface

One of the USB Audio classes must be set during system set-up. The DAC is shipped set to USB Audio Class 2.

USB Audio Class 1**:** The interface operates without a special driver at up to 96kS/s.

To select Class 1, open the menu, navigate to the Settings > USB Class menu page. The button sequence is: **Menu, ►, Menu, ◄, ◄, ◄, ◄,** and then use the **Menu** button to select the Class 1 icon. Wait 10 seconds while the Class 1 code is loaded.

USB Audio Class 2**:** The interface operates at up to 384kS/s (including DSD/64 over PCM).

For Mac OSX, version 10.6.3 or later is required.

For Windows, the ***dCS*** USB Class 2 Driver 2014 must be installed onto the computer before use (see below).

To select Class 2, open the menu, navigate to the Settings > USB Class menu page. The button sequence is: **Menu, ►, Menu, ◄, ◄, ◄, ◄,** and then use the **Menu** button to select the Class 2 icon. Wait 10 seconds while the Class 2 code is loaded.

The Vivaldi DAC / Upsampler v1.1x onwards is not compatible with the 2012 version of the USB Class 2 driver.

Loading the Windows driver for USB Class 2

- If ASIO4ALL or any other ASIO driver (e.g. for a sound card) is loaded on your computer, please uninstall it - otherwise the ***dCS*** driver will not work correctly.
- Power up the DAC and the computer.
- Make sure the DAC is set to USB Audio Class 2 - otherwise the driver installation will fail.
- Go to http://www.dcsltd.co.uk/products/vivaldi-dac/, click the **Support** link, then click the **Download** button next to **USB Class 2 Driver 2014**. Unzip the file to a new folder.
- Select "**Run > setup.exe**".
- Follow the on-screen prompts.
- When prompted, connect the DAC's **USB** port to the computer's USB port.
- Wait until installation is complete, then remove the driver disc and re-start the computer.

If you connect a Vivaldi DAC set for USB Audio Class 2 to a Windows computer without first loading the driver, the interface will not work and the computer will display the warning message: **Device cannot start**.

Basic setup with a PC

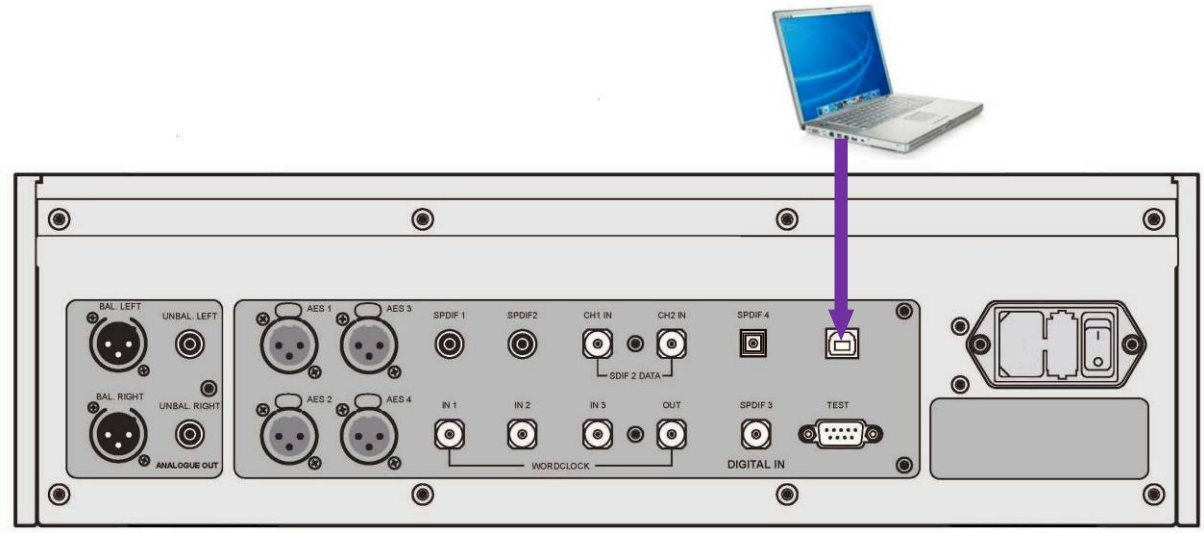


Figure 2 – Connecting the USB interface.

- Connect one of the computer's USB ports to the **USB** port on the DAC's rear panel.
- Press the **Input** button repeatedly until **USB** is displayed. If the source is transmitting PCM data, the DAC will lock to the source and the sample rate will be displayed.

The DAC's USB interface operates in asynchronous mode. This allows the clock inside the DAC to control the delivery of data from the computer, avoiding the use of the computer's inaccurate and jittery clock.

A word about Music Playing Software

There are countless programs that can play music on Windows™ PC and Apple Mac™ OSX systems. Unfortunately, not all of them present the data completely unprocessed to the USB ports. For example, Windows Media Player re-samples all data to 24 bits at the original sample rate, while iTunes converts data as necessary to the output sample rate set in the OSX Audio MIDI Set-up panel.

With such a proliferation of playing software, and updates being issued frequently, it is impossible for ***dCS*** to be fully up-to-date with the behaviour and performance of all programs. If you have questions or problems, we would urge you to take them up with your software vendor. What we will say is that different programs operate very differently and it is well worth finding out exactly how your particular program processes the audio.

We suggest that you use a premium music streaming program, such as JRiver Media Center (Windows or Mac) or Audirvana (Mac), rather than relying on the software bundled with the operating system.

Selecting the Vivaldi DAC as your Audio Output device

Whichever program you are using to play your music, your computer may not automatically select your ***Vivaldi DAC*** as the preferred playback device. You can correct this as follows:

Mac OSX™ - Open **Finder**, click on the **Go** tab and select **Utilities** > **Audio MIDI Setup.** Select **dCS Vivaldi…** from the list on the left-hand side, right-click on it, and choose **Use this device for sound output** from the drop down list. Set the **Format** to **384000.0Hz** and **2ch-24bit Integer**. Close **Audio MIDI Setup**.

Windows 8.1™ / Windows 7™ / Windows Vista™ - Go to **Start** > **Control Panel** > **Sound**. In the **Playback** panel, right-click **dCS Vivaldi** or **dCS Vivaldi DAC Audio** and choose **Set as Default Communication Device**. Click the **Enhancements** tab and check **Disable all enhancements**. Select the **Advanced** tab, choose **24 bit, 192000 Hz (Studio Quality)** from the drop-down box. Check the 2 boxes under **Exclusive Mode**, click **OK** and **OK** again to close the **Sound** panel.

Windows XP™ - Go to **Start** > **Control Panel** > **Sounds and Audio devices**, click on the **Audio** tab. In the **Sound Playback** - **Default Device** panel, select **dCS Vivaldi…** or **dCS High Speed Audio Device** from the drop down list. Click **Advanced**, click the **Performance** tab, set **Hardware Acceleration** to **Full**. Click **OK** and **OK** again to close the **Sound** panel.

This is basic setup information. Please refer to the "***dCS*** **Guide to Computer Audio**" for more specific information.

Open your streaming program, select the **Vivaldi DAC** in the **Options** or **Preferences** panel and play some music.

Go to STEP 3.

STEP 3 – Connecting the Analogue Outputs

Choose one of the following two sections:

Using a preamplifier

- Set the preamplifier volume control to a low level.
- Connect either the balanced (XLR connectors) or unbalanced (RCA phono connectors) outputs on the DAC's rear panel to matching line level inputs on your preamplifier (probably labelled CD or AUX).
- Turn the DAC's rotary control clockwise to set the **Volume** to maximum (**- 0.0dB** on the display).

Slowly increase the preamplifier volume until the music is at the right level.

Using a power amplifier directly

- Turn the DAC rotary control counter-clockwise to set the Volume to around -40.0dB as shown on the display.
- Connect either the balanced (XLR connectors) or unbalanced (RCA phono connectors) outputs on the DAC rear panel to matching inputs on your power amplifier. Switch on the power amplifier.
- Turn the DAC rotary control slowly clockwise until the music is at the right level.

Play some music, you should have audio.

The most common fault reported when using our balanced outputs is hiss, unstable levels and a thin sound on both channels. This is caused by connecting the DAC's balanced output stage to an unbalanced input on an XLR connector with pin 3 left unconnected. This does not work correctly with a balanced and floating output stage – you must connect pin 3 to pin 1 (ground) to complete the signal path.

Another possible cause of this fault (probably on one channel only) is a broken cable.

The Vivaldi DAC has independent balanced and unbalanced output stages, so you can connect them to different amplifiers if you wish.

STEP 4 - Setting the Output Level

If the preamplifier volume setting for a comfortable listening level is too high or too too low, you may need to change the Output Level setting.

Setting the Output Level to 6V can cause some preamplifiers to overload and distort. For this reason, we recommend the 2V setting if a preamplifier is used.

Similarly, if you are driving a power amplifier directly and the DAC **Volume** setting for a comfortable listening level is higher than **–10.0** or lower than **–30.0** try changing the Output Level setting by pressing the buttons in this sequence: **Menu, ►, Menu, ►, Menu.**

If the setting is 2V and the DAC **Volume** is still set well below **–30.0**, your power amplifier or loudspeakers must have a very high sensitivity. Consider a preamplifier or try some passive attenuators.

STEP 5 – Choosing a Sync Mode

So far, the system has been set up to lock to the clock generated by the source. If you are using the SDIF-2 interface, the DAC will lock to a word clock generated by the source. The basic Sync Mode for the USB interface is Master Mode because it is an asynchronous interface. This is the simplest arrangement, but it does not give the best sonic performance due to clock jitter.

If your source equipment has a word clock input, you may be able to reduce the jitter in your system by either setting the DAC to Master Mode or locking the system to a Master Clock. If not, you can miss out this section.

The Sync Mode setting must be set separately for each input that is used. This arrangement is necessary to allow a mixture of clocked and un-clocked sources to be used in the same system.

Using the DAC's AES & SPDIF inputs in Master Mode

You can use Master Mode ONLY if your source equipment can lock to a 44.1kHz word clock and the DAC is receiving data at 44.1, 88.2, 176.4 or 352.8kS/s or DSD. If the system is not set up correctly and fails to lock, you will hear clicks / noises from the speakers and the signal may be distorted.

- Connect the equipment as shown, taking special care to connect the clock cable correctly.

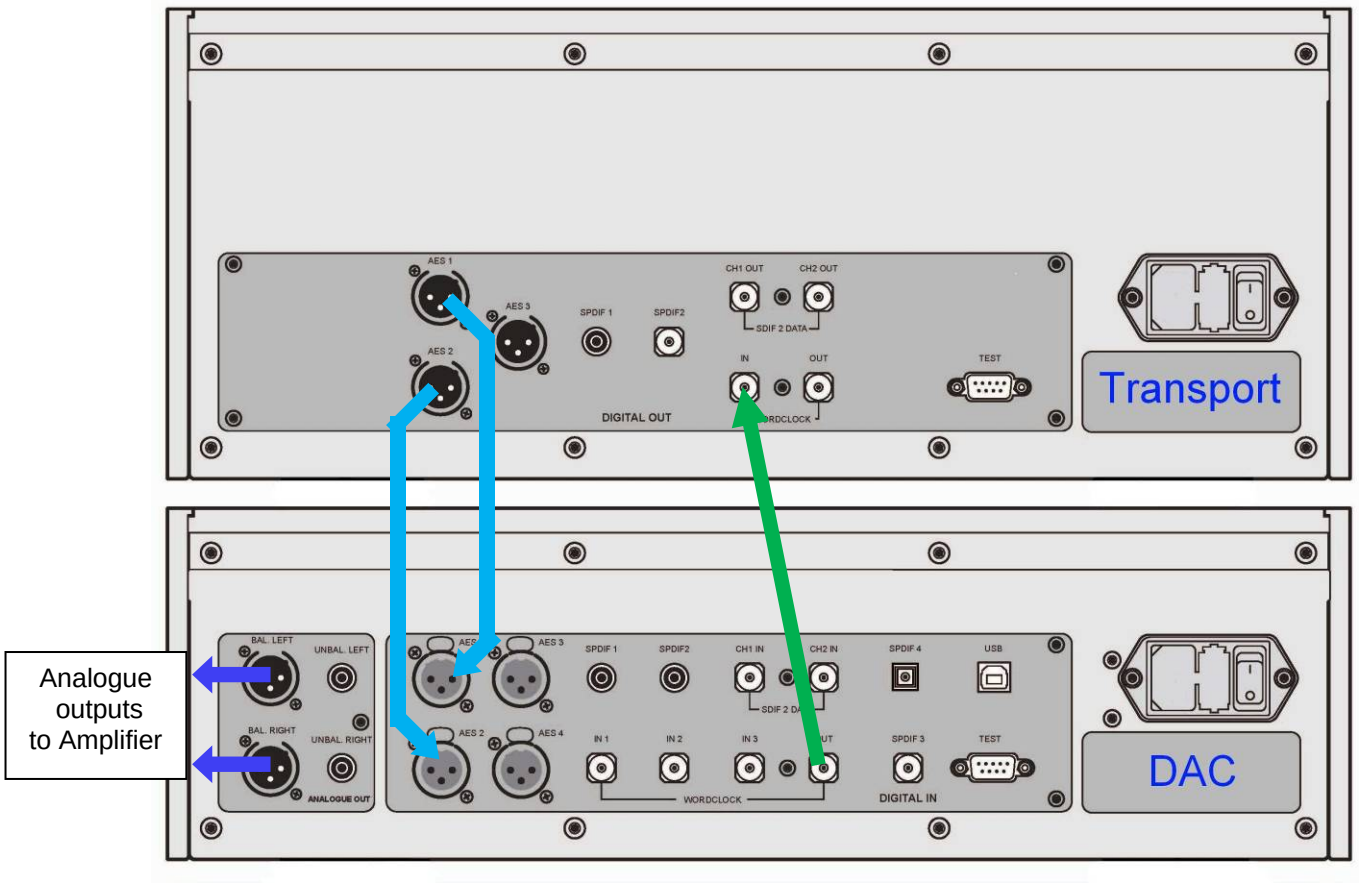


Figure 3 – Using the Vivaldi Transport with the DAC in Master Mode

To select Master Mode, open the DAC's menu, navigate to the Settings > Sync Mode menu page. The button sequence is: **Menu, ►, Menu,** and then use the **Menu** button to select the Master Mode icon.

Using a Master Clock in a CD/SACD system

The performance can be improved further by adding a Vivaldi Clock to the system as shown below.

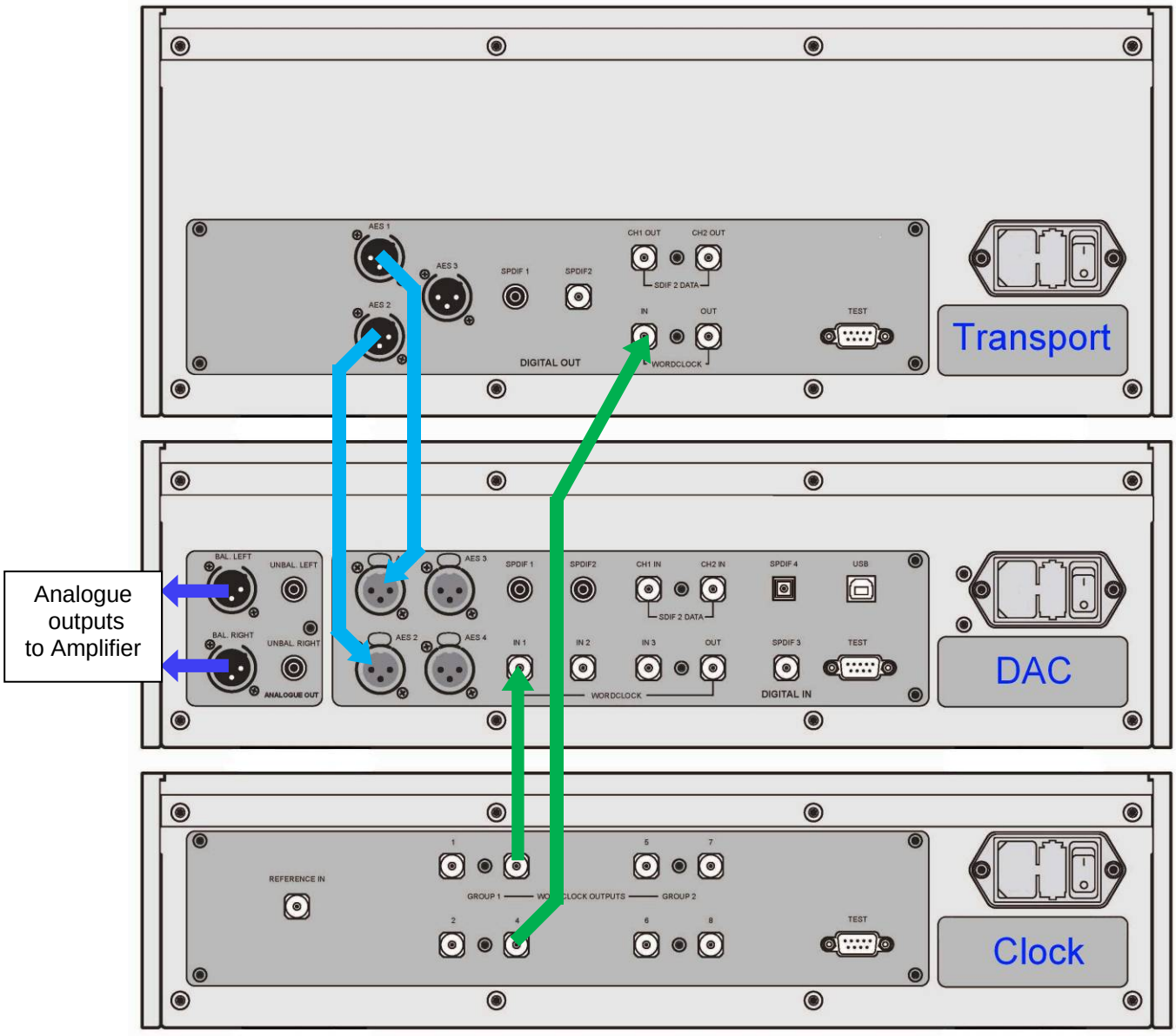


Figure 4 – Using the Vivaldi Transport, DAC and Clock together

- Connect one of the Clock's **Word Clock Group 1 Outputs** to the **Word Clock In**puts of the Transport and DAC.
- Use the Clock's **Freq1** button to set the Group 1 Outputs to **44.1kHz**, to suit the CD Transport.

To sync the DAC to Word Clock 1, open the menu, navigate to the Settings > Sync Mode menu page. The button sequence is: **Menu, ►, Menu,** and then use the **Menu** button to select the Word Clock 1 icon.

The system will re-lock and un-mute.

Please consult the Vivaldi Clock manual for more information on using a Master Clock.

Please consult the Upsampler manual if your system includes a Vivaldi Upsampler.

The next step is crucial – sit back and enjoy the music.

A full Vivaldi system

The Vivaldi's clocking system has been designed to be very comprehensive to cope with multiple sample rates with a mixture of clocked and un-clocked sources. This applies particularly to streaming computer audio files with different sample rates, or using an Upsampler with a variety of output sample rates.

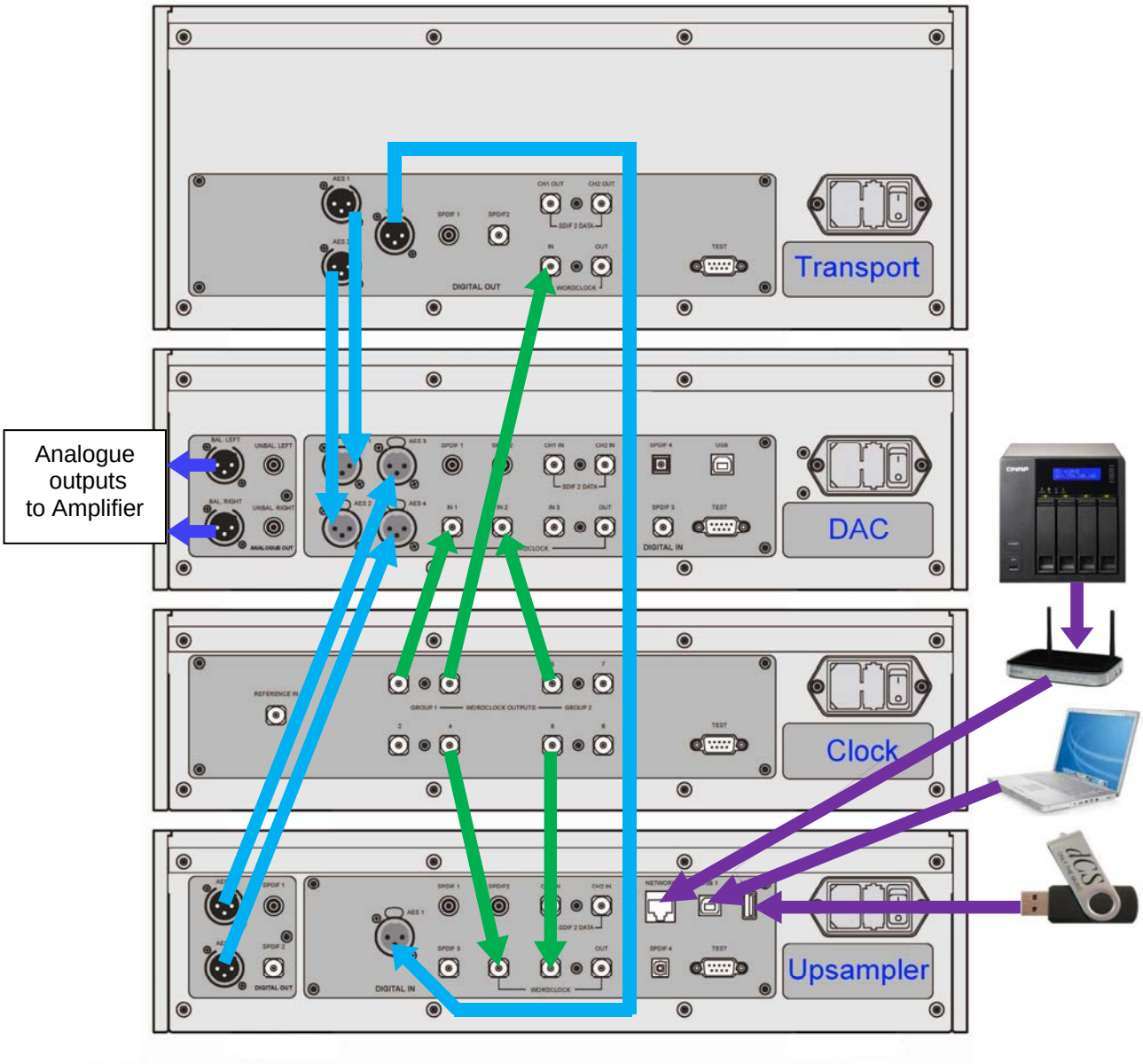


Figure 5 – A 4-box Vivaldi system plus computer audio sources

The system shown above makes excellent use of the Vivaldi's facilities. The Upsampler can be sourced from the Transport, a PC, a NAS drive, an iPod/Phone/Pad or a USB flash drive. The multiple clock connections (shown in green) ensure that the DAC and Upsampler can always access a suitable clock, despite changing file sample rates and changing Upsampler output rates.

The Vivaldi Master Clock has 2 Groups of outputs, each of which can be set to any of 6 standard clock frequencies. The DAC and Upsampler have 3 and 2 Word Clock inputs respectively, to ensure they can have access to a suitable clock despite changing sample rates in the system.

- Set Master Clock **Freq1** to **44.1kHz** and **Freq2** to **48kHz**.
- Connect one of the **Clock Group 1** outputs (44.1kHz) to the **Word Clock Input** of the Transport – it will automatically sync.
- Connect one of the **Clock Group 1** outputs (44.1kHz) to the DAC's **Word Clock In1** input and one of the **Clock Group 2** outputs (48kHz) to the DAC's **Word Clock In2** input.
- Connect one of the **Clock Group 1** outputs (44.1kHz) to the Upsampler's **Word Clock In1** input and one of the **Clock Group 2** outputs (48kHz) to the Upsampler's **Word Clock In2** input.

Set the DAC and Upsampler Sync Mode menu pages to Auto. Remember that this must be set separately for each active input.

- Connect the Upsampler's **AES1+2** output to the DAC's **AES3+4** input.
- Connect the Transport's **AES1+2** output to the DAC's **AES1+2** input.
- Computer audio sources as required can be connected to the Upsampler's Asynchronous USB interfaces and a NAS drive may be connected via a router to the Upsampler's Network input (also Asynchronous). Please see the Upsampler manual for more information.
- Set the Clock's Settings > Dither menu pages On or Off as you prefer.

Advanced options

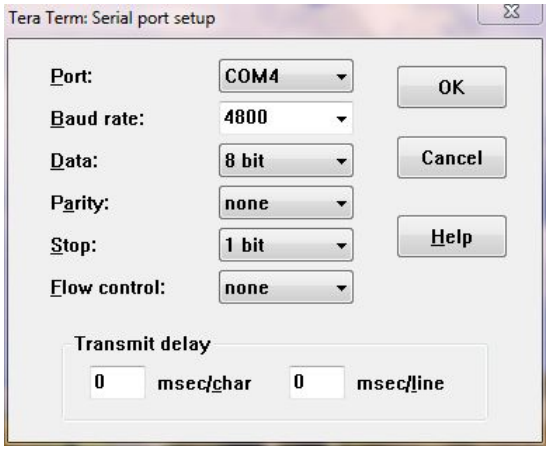
Customising the input configuration

The Vivaldi DAC's inputs can be renamed to suit your particular system using a computer running a terminal emulator program. The Vivaldi Upsampler has the same feature. The procedure using a Windows PC with TeraTerm is described here, but other programs such as PuTTY or ZTerm can be used. If you have difficulty with this, please ask your Dealer for help.

- Power up the DAC and a Windows PC.
- If necessary, download Tera Term from http://en.sourceforge.jp/projects/ttssh2/releases/ and install it on your PC. (If the link is broken, please search for the latest version of Tera Term online.)

Set the DAC's Settings > RS232 menu page to the Text option.

- Use a USB-to-RS232 adapter cable to connect the DAC's **Test** port to one of the PC's USB ports.
- Run ttermpro.exe.
- Click the **Serial** button – Tera Term will automatically select the port connected to the DAC. Click **OK**.
- Click **Setup > Serial Port**, set the **Baud rate** to **4800** and click **OK**.



- In the terminal window, type the command: **NAME n = newname** where:
  - **n** is the number corresponding to the standard input name in the list below and

AES1	0	**AES2**	1	**AES1+2**	2
AES3	3	**AES4**	4	**AES3+4**	5
SPDIF1	6	**SPDIF2**	7	**SPDIF3**	8
Toslink	9	**SDIF-2**	10	**USB**	11

  - **newname** is the personalised name you want to use for that input, such as CD-SACD, TV or COMPUTER. It can be up to 8 characters long, consisting of:

    capital letters A-Z, numbers 0-9 or + - / = . : ? ! @ &

- Press **Enter**.

For example:
- to rename the **AES1+2** input to CD-SACD, type: **NAME 2 = CD-SACD** and press enter.
- to rename the **USB** input to COMPUTER, type: **NAME 11 = COMPUTER** and press enter.

Later on, if you want to revert to the standard input names (**AES1**, **SPDIF2**, etc.), select the Configuration > Reset Input Names menu page.
Your customised input names will be permanently deleted.

FRONT PANEL

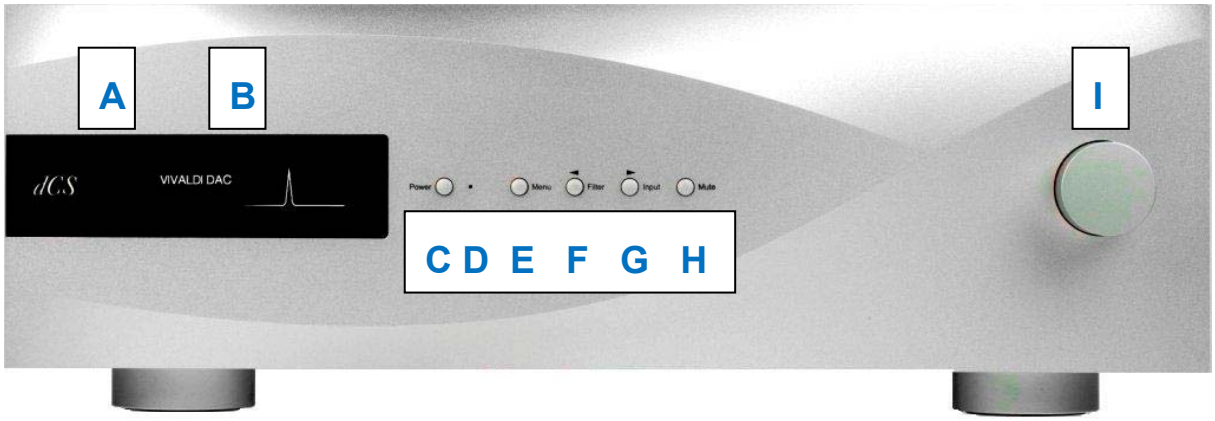


Figure 6 – Front panel

Remote Control Receiver

Aim the remote control handset towards the receiver (A) for best sensitivity.

Display

In normal use, the display (B) is split into 4 areas:

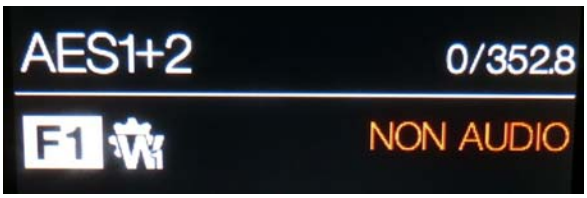
The top left corner usually shows the selected input (e.g. **AES1+2**). While you are changing settings (e.g. Filter), the current setting may be displayed here briefly.

The top right corner shows the locking status, the data format. Some examples are **No Input**, **16/44.1** (the number of active bits and the sample rate), **24/192, DSD** or **MUTE**. Between tracks on a CD, the number of active bits is zero, so **0/44.1** may be displayed.

The icons at the bottom left corner are the selected **Filter** (**Filter 1** is shown) and the Sync mode (slave to **Audio** is shown). Other icons such as Phase Invert or Channel Swap appear here when required.

The "staircase" icon gives a visual indication of the **Volume** or **Balance** setting, with the setting shown in text as well (**0.0dB** is shown).

If the DAC is receiving an AES or SPDIF data stream in which the NonAudio flag has been set, the DAC will mute and display **Non Audio**. This happens when the DAC is connected directly to a Vivaldi Transport (v1.10 or later) and a disc is loaded. The volume "staircase" will reappear briefly if the volume setting is changed. The Transport cancels the NonAudio flag when the disc starts playing.



Details of the menu displays are shown in the Menu section on page **27**.

To avoid unnecessary display wear, we recommend switching off or setting the unit to Sleep mode at the end of the listening session.

Power Button

To switch on, ensure the rear panel switch is set to **I** and press the **Power** button (C) on the front panel once. Note that the unit cannot be turned on from the remote control.

To set the unit to sleep mode, press the **Power** button once. The main display will turn off, the LED (D) beside the button will light, and the analogue outputs will mute, but the unit will remain close to running temperature. Press again to return to normal operation.

To switch off, hold down the **Power** button for about 3 seconds until **Switching Off** appears on the display, then release it.

When the menu is open, press the **Power** button to close the menu.

Menu Button

Press the **Menu** button (E) to open the menu, select menu pages and change settings. See the Menu section on page **27** for information on using the menu features.

Filter Button

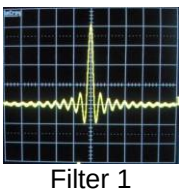
Use the **Filter** button (F) to select your preferred filter. This is a personal preference and is best done by ear. The choice of filter may depend on the type of music you are listening to.

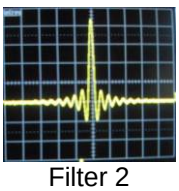
In PCM mode, the first 4 filters give different trade-offs between the Nyquist image rejection and the phase response. **Filter 1** has the best rejection of (unwanted) Nyquist images and the sharpest roll-off, resulting in the poorest transient response of the four. Filters 2, 3 and 4 have progressively more relaxed image rejection and progressively better transient response. **Filter 2** is often preferred for orchestral music, while **Filter 3** and **Filter 4** are often used for rock music.

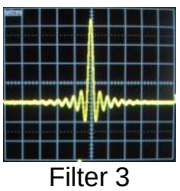
If the source data rate is 176.4, 192, 352.8 or 384kS/s, two extra filters are available. **Filter 5** has a Gaussian response (which has no overshoot on transients, with a relaxed roll-off) and **Filter 6** is an asymmetrical type (which features almost no pre-ringing).

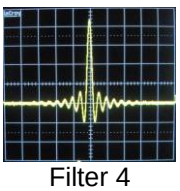
There are 2 extra filters for 44.1kS/s operation. **Filter 5** is an asymmetrical design with non-linear phase and no pre-ringing. **Filter 6** is a new sharp filter which has linear phase and pre-ringing. Try them and decide for yourself which you prefer.

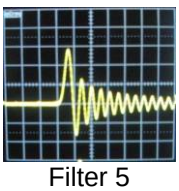
The impulse responses for the six 44.1kS/s filters are shown below. (The filters for other sample rates will have different pulse responses.) The horizontal or time axis is graduated at 100 microseconds per division.

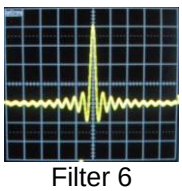

Filter 1


Filter 2


Filter 3


Filter 4


Filter 5


Filter 6

DSD mode has 4 filters, but these progressively reduce the out-of-band noise level (which is inherent in the 1-bit nature of DSD). **Filter 1** is the usual setting – it gives the widest bandwidth (about 90kHz) and the highest level of out-of-band noise. If your system sounds harsh, try **Filter 2** or **Filter 3**. These progressively reduce the out-of-band noise level at the cost of some bandwidth. **Filter 4** is primarily intended for troubleshooting, not listening, as it cuts off sharply above 25kHz to minimise the out-of-band noise.

"I don't have time to listen to all these filters! Which ones do you suggest?"

Filters are definitely a personal choice, but we can suggest the following:

44.1kS/s – **Filter 5** (asymmetrical)
176.4 - 384kS/s – **Filter 6** (asymmetrical)
32, 48, 88.2, 96kS/s – **Filter 2**
DSD – **Filter 1**

The DAC remembers the last filter set for every sample rate.

When the menu is open, the **Filter** button changes to the ◄ button, used to page backwards through the menu.

Input button

Press the **Input** button (G) repeatedly to cycle through the available digital inputs.

Inputs which are not connected to an active source do not appear in the list and so cannot be selected. This is an important change from previous versions.

The source sample rate is automatically detected. The full sequence is:

…, **AES1**, **AES2**, **AES1+2, AES3, AES4, AES3+4, SPDIF1 (RCA)**, **SPDIF2 (RCA), SPDIF3 (BNC), Toslink**, **SDIF-2, USB,** …

AES1+2 and **AES3+4** are not available if the Dual AES1+2 and Dual AES3+4 menu pages are set to OFF.

When the menu is open, the **Input** button changes to the ► button, used to page forwards through the menu.

Mute Button

Use the **Mute** button (H) to mute and un-mute the analogue outputs. When the unit is muted, **MUTE** appears on the display.

Rotary Control

The Rotary Control (I) usually controls the **Volume** setting. The **Volume** setting changes in 0.5dB steps between 0dB (full volume) and -50dB, in 1dB steps down to -80dB and then mutes below -80dB.

When the Balance menu page is open or the remote **Balance** button has been pressed, it adjusts the channel **Balance** instead.

While the menu is open, the Rotary Control pages forward and backwards through the menu instead of changing the volume.

REAR PANEL

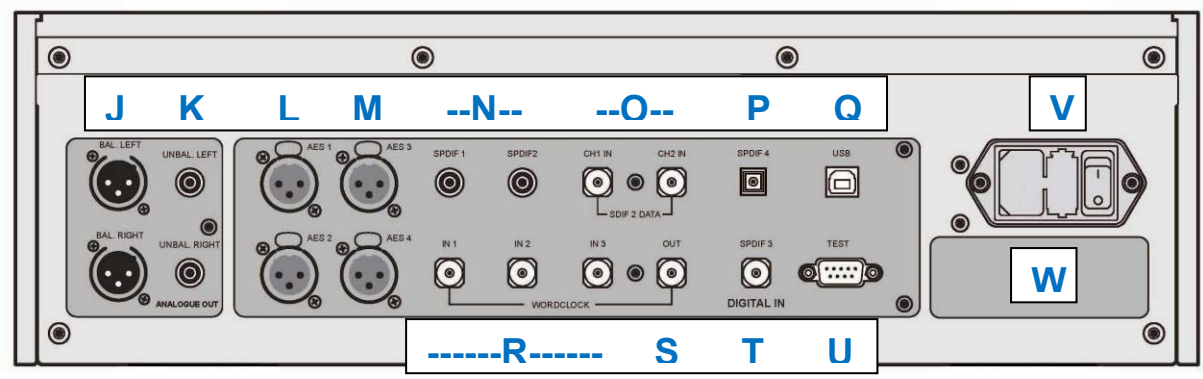


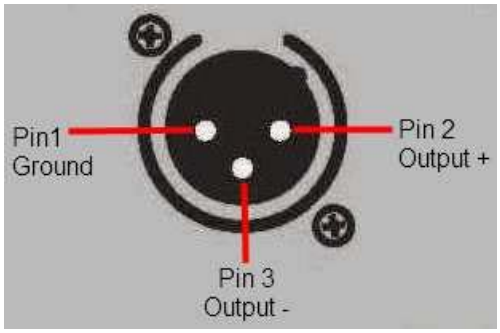
Figure 7 – Rear panel

Analogue Outputs

The unit features independent **Balanced Outputs** (J) on XLR connectors and **Unbalanced Outputs** (K) on RCA connectors. The Left channel outputs are in the top row and the Right channel outputs are on the lower row.

Our **Balanced Outputs** are intended to be connected to true balanced inputs only. They are electronically balanced and floating, so they behave like an audio transformer. This arrangement enhances the rejection of hum and interference picked up by the cable when used with a true balanced input.

Most other DACs use a much simpler circuit that does not offer the same level of performance.



Some amplifier manufacturers provide unbalanced inputs on XLR connectors by leaving pin 3 floating. This arrangement does not work correctly with a floating output stage, resulting in extra noise, unstable signal levels and a “thin” sound. If you want to use the Vivaldi DAC with this type of input, link pin 3 to pin 1 in the cable at the amplifier end. In such cases, we recommend that you use the **Unbalanced Outputs** instead.

AES Digital Inputs

The **AES1, AES2** (L)**, AES3** and **AES4** (M) inputs can be used individually at sample rates up to 192kS/s, including DoP.

If the Dual AES1+2 menu page is set to On or Auto, **AES1+2** can be used together as a **Dual AES** pair at 88.2, 96, 176.4, 192, 352.8 or 384kS/s. **AES3+4** behave in the same way if the Dual AES3+4 menu page is set to On or Auto. A Vivaldi Upsampler connected to **AES3+4** can tunnel App commands to the DAC.

Both Dual AES interfaces will also accept ***dCS***-encrypted SACD data from the Vivaldi Transport and DoP data (DSD over PCM) from the Vivaldi Upsampler.

For Dual AES mode to work correctly, the source must actually generate Dual AES data, not just the same single AES data on 2 connectors!

SPDIF Digital Inputs

The unit features 3 electrical SPDIF inputs, labelled **SPDIF1**, **SPDIF2** (N) and **SPDIF3** (T), as well as an optical SPDIF input on a **Toslink** connector (P). Pull out the dust cover before using the **Toslink** input. The electrical inputs will accept sample rates up to 192kS/s including DoP, the **Toslink** input accepts sample rates up to 96kS/s and is not tested or guaranteed at higher sample rates.

SDIF-2 Digital Interface

The **SDIF-2** interface will accept either SDIF-2 PCM data at sample rates up to 96kS/s, or SDIF-2 DSD data. The unit automatically detects the data format and sets the correct mode. The interface consists of two data inputs labelled **CH1** and **CH2** (O). Operation in SDIF mode requires that a word clock from the source is connected to the **Word Clock In1, In2** or **In3** connector (R). Note that the interface can fail to lock correctly if the data sample rate changes but the Word Clock does not.

The interface also accepts data in SDIF-3 format (DSD only), but this not tested or guaranteed.

USB Interface

The **USB** interface on a 'B' type connector (Q) will accept PCM data at up to 24 bits / 384kS/s from a Windows™ PC, Apple Mac™ PC or sound server equipped with a suitable USB2.0 interface. The interface will also accept DSD/64 data packaged in DoP format and decode it as DSD. This interface operates in true asynchronous mode, which makes the ***Vivaldi DAC*** immune to clock jitter from the computer / sound server. The DAC uses its own internal clock or locks to the Master Clock connected to one of the **Word Clock** inputs. Feedback through the USB cable to the computer controls the data delivery rate.

We have tested this interface with several common formats running on Windows™ 8.1, Windows™ 7, Windows™ Vista (SP2), Windows™ XP (SP3) and Apple Mac™ OSX 10.5 - 10.10 with various PCM streaming programs but we cannot accept responsibility for correct operation with all source devices, operating systems or software.

The **USB** interface is designed to work with a computer or sound server. Nothing useful will happen if you connect the interface directly to an MP3 player or a flash drive. The Vivaldi Upsampler does support this mode.

The Settings > USB Class menu page can set the interface to Class 1 (up to 96kS/s without a special driver) or Class 2 (up to 384kS/s, a special driver is not required for OSX 10.6.3 onwards, the ***dCS*** USB Class 2 Driver 2014 is required for Windows).

Operation at 352.8 or 384kS/s on Windows PCs requires the 2014 version of the ***dCS*** USB Class 2 Driver. If you have updated your DAC software from v1.0x, un-install any earlier version of the Driver from your Windows PC, download the updated Driver from http://www.dcsltd.co.uk/products/vivaldi-dac/ and install it.

Word Clock Inputs and Output

Each of the three **Word Clock In** connectors (R) will accept standard word clock from the source equipment or a master clock at 32, 44.1, 48, 88.2, 96, 176.4 or 192kHz. The clock frequency **MUST** be an exact multiple of the data rate, otherwise the system will not lock. Use the Settings > Sync mode menu page to lock the selected input to the selected external word clock. The source **MUST** be locked to the same clock, otherwise the system will not be locked and periodic clicks or other undesirable noises or dropouts will be heard on the outputs.

Each of the **Word Clock In**puts may be used individually, but to make operation easier, the ***Vivaldi*** DAC's Sync mode menu page features an Auto mode. In this mode you can connect a 44.1, 88.2 or 176.4kHz word clock to **Word Clock In1** and a 48, 96 or 192kHz word clock to **Word Clock In2**. With a source connected to another feed from the same Clock, the DAC can select the correct clock frequency.

Word Clock In3 is primarily intended to be connected to the Upsampler's **Word Clock Out**put to improve performance with sources that do not have a Word Clock input.

When the unit is set to Master mode, the DAC uses its internal clock instead of locking to the data or one of the **Word Clock In**puts, then the **Word Clock Out** connector (S) carries a word clock at the same rate as the single-wire input rate. This **MUST** be connected to the source equipment, so that the system can lock.

Word clock is used for synchronisation only, it does not carry digital data.

Test interface

The **Test** interface (U) is an RS232 interface two modes, set by the Settings > RS232 menu page.

- Binary mode is used to remotely control the unit during automated production testing at ***dCS***.
- Text mode is for use with a household automation system. If you would like to use this mode, please download the list of remote control commands from www.dcsltd.co.uk.

The interface is designed to be used with a "straight through" cable, wired pin 1 to pin 1, etc.

The pin connections are:

- Pin 2 – ***dCS*** unit transmit
- Pin 3 – ***dCS*** unit receive
- Pin 5 – ground
- Shell – cable screen & drain wire

Mains inlet

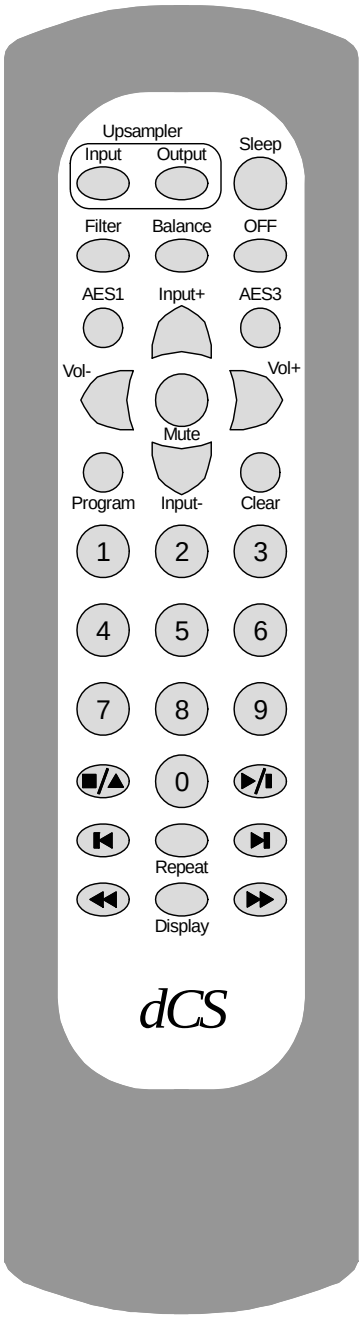
Power is connected via a standard IEC320 connector (V), protected by a fuse and isolated by a 2-pole power switch.

Label

The label (W) states the unit's serial number and the nominal voltage to which the unit is set. It is important to quote the serial number if you need assistance.

REMOTE CONTROL

The upper section of the Remote Control is mainly for the DAC, the lower section is for the Transport.



Hold down the **Sleep** button for 2 seconds to set the system to sleep mode. Press the **Sleep** button again to return to normal operation.

In Sleep mode, press the **OFF** button to turn the system off.

The **Upsampler Input** button selects the Upsampler's input. The **Upsampler Output** button selects the Upsampler's output sample rate.

The **Filter** button changes the DAC filter setting.

The **Balance** button toggles the DAC between Volume and Balance adjustment modes.

The **AES1** button selects the DAC's AES1 input, the **AES3** button selects the DAC's AES3 input.

The **Input+** and **Input–** buttons cycle through the DAC's available inputs.

The **Vol+** and **Vol–** buttons adjust the DAC's Volume / Balance. **Mute** turns the DAC's outputs off and on.

The **Program** and **Clear** buttons are used with the **0** – **9** buttons to set or change the Transport's track sequence for the loaded disc.

The **0** – **9** buttons select the current track to be played by the Transport. Pressing **5** or **05** will select track 5.

The **Stop/Eject**, **Play/Pause**, **Previous Track**, **Next Track**, **Jog Back** and **Jog Forward** buttons operate in the same way as those on the Transport front panel.

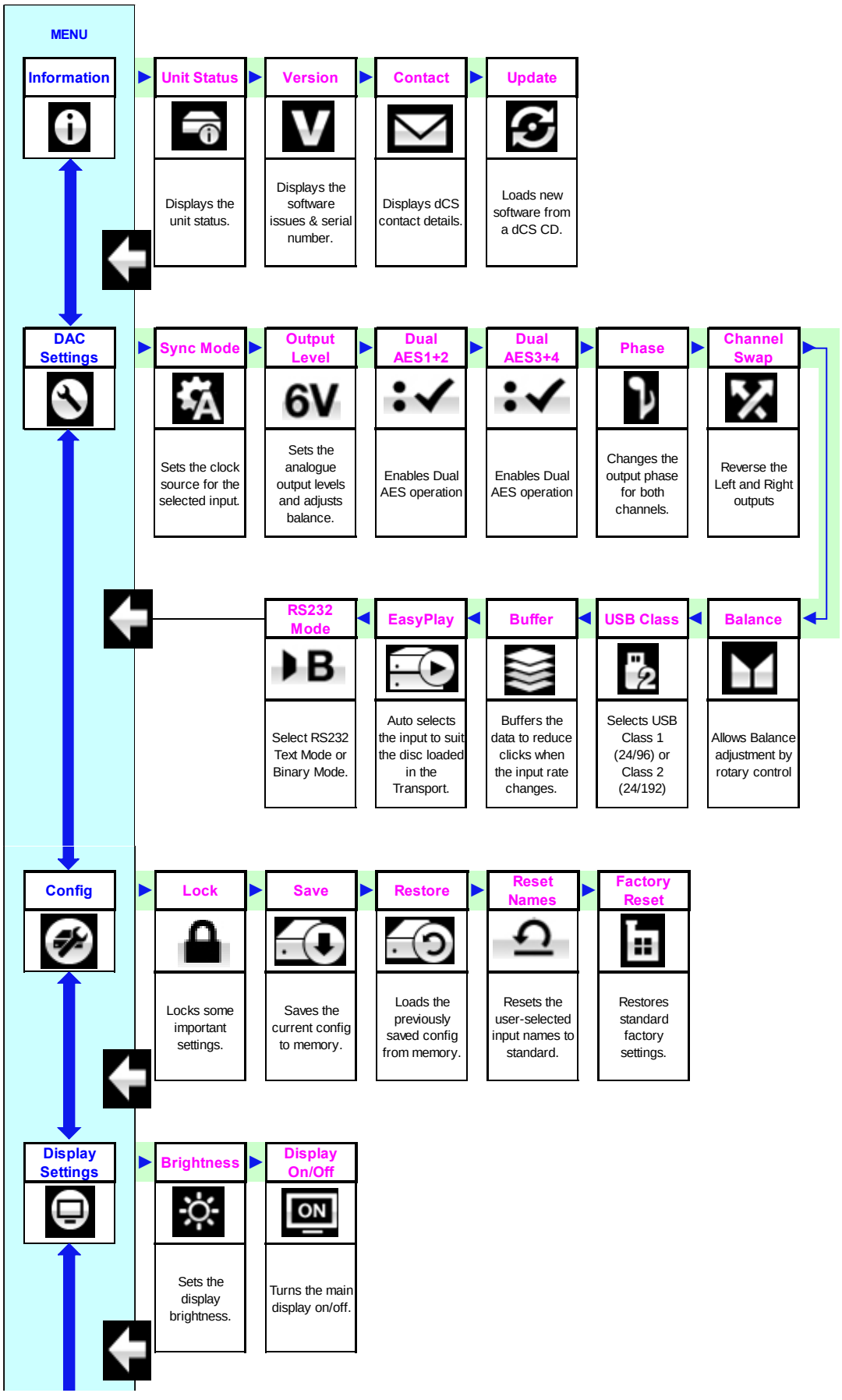
The **Repeat** button cycles the Transport through **Repeat 1** (repeat the current track), **Repeat** (repeat the whole disc) and **Repeat Off**.

The **Display** button changes the time displayed by the Transport, cycling through **Track Elapsed**, **Track Remaining**, **Disc Elapsed** and **Disc Remaining**.

When the system is completely off (not just in sleep mode), press the front panel **Power** buttons to turn it on. You cannot use the Remote Control for this. The **OFF** button will only operate if the system is in sleep mode.

If you are using the two Dual AES input pairs with a Vivaldi Transport and Upsampler, set the DAC's two Dual AES menu pages to Auto. Now you can switch between the two Dual AES sources using the remote's **AES1** and **AES3** buttons.

THE MENU


MENU
Information
Unit Status
Displays the unit status.
Version
Displays the software issues & serial number.
Contact
Displays dCS contact details.
Update
Loads new software from a dCS CD.
DAC Settings
Sync Mode
Sets the clock source for the selected input.
Output Level
6V
Sets the analogue output levels and adjusts balance.
Dual AES1+2
Enables Dual AES operation
Dual AES3+4
Enables Dual AES operation
Phase
Changes the output phase for both channels.
Channel Swap
Reverse the Left and Right outputs
RS232 Mode
B
Select RS232 Text Mode or Binary Mode.
EasyPlay
Auto selects the input to suit the disc loaded in the Transport.
Buffer
Buffers the data to reduce clicks when the input rate changes.
USB Class
2
Selects USB Class 1 (24/96) or Class 2 (24/192)
Balance
Allows Balance adjustment by rotary control
Config
Lock
Locks some important settings.
Save
Saves the current config to memory.
Restore
Loads the previously saved config from memory.
Reset Names
Resets the user-selected input names to standard.
Factory Reset
Restores standard factory settings.
Display Settings
Brightness
Sets the display brightness.
Display On/Off
ON
Turns the main display on/off.

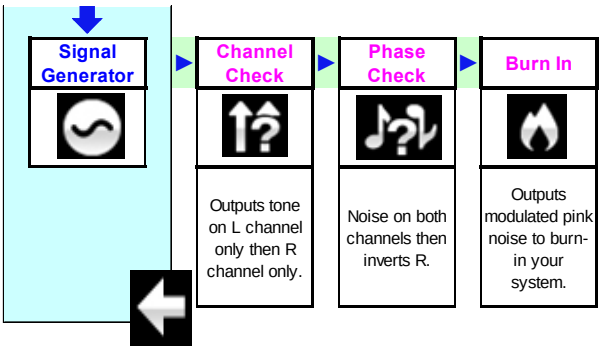

Signal Generator
Channel Check
Outputs tone on L channel only then R channel only.
Phase Check
Noise on both channels then inverts R.
Burn In
Outputs modulated pink noise to burn-in your system.

Figure 8 – The menu sequence

Using the Menu

The menu gives the user access to a range of additional features. It also allows new features and performance enhancements to be added later by software updates.

The menu is controlled by four buttons.

- Press the **Menu** button to open the menu or select a setting.
- Press the ► button to page forward through the menu.
- Press the ◄ button pages backward through the menu.
- Press the **Power** button to close the menu or just wait 10 seconds.
- While the DAC's menu is open, the Rotary Control pages forwards or backwards.

Use the Menu Guide sheet to help you find the right menu page.

Each unit in the range has either four or five top-level menu pages:

The INFORMATION menu gives unit set-up details, software issues, serial number and contact details.

Each model has a different SETTINGS menu, which allows you to set some features that are not directly accessible from the front panel.

The CONFIGURATION menu allows you to lock important settings, save a standard setup and reset the unit.

The DISPLAY SETTINGS menu is used to adjust the display.

The SIGNAL GENERATOR menu (featured on the Transport, Upsampler and DAC only) contains test and set-up routines.

Use the ► button to move the blue highlight to the menu you want, then press the **Menu** button to select it. The next menu level down is displayed. Use the ► button to move the highlight to the menu page you want, then press the **Menu** button to display the information or change the setting.

Select the return icon to go back to the previous menu level.

INFORMATION Menu

Unit Status

The **Unit Status** page displays:

- The long version of the serial number, including the hardware configuration code.
- Each input and the sample rate detected on that input.
- Each Word Clock input and the clock frequency detected on that input.
- Internal temperature ....°C.

Use the ◄ ► buttons to scroll up or down the list. This page does not time out, press the **Menu** button to exit.

If your system is not behaving as you expect, the Unit Status pages can help you find set-up or connection errors.

Version

The Version page displays the software versions loaded in the unit. Please have this information ready if you contact your dealer for any reason:

- Control Board: 1.xx (this is the main software version)
- Front panel: 1.xx

This page does not time out, press the **Menu** button to exit.

Contact

The **Contact** page displays ***dCS*** web-site URL and support email address. This page does not time out, press the **Menu** button to exit.

If you have any difficulty, please contact your dealer for help first.

Update

The **Update** feature allows you to load new software into your system from any STANDARD CD player / transport or from a computer streaming bit-perfect data via the USB interface. Note that some non-Red-Book CD transports change the digital data and cannot be used to download new software. Please follow the instructions supplied with the update disc carefully.

If you accidentally start an Update, do not worry. The unit will automatically detect it is not receiving updated software and will abort the process. The software will not have been changed.

SETTINGS Menu

Sync Mode

This page sets the clocking for the digital input that is currently selected. The DAC remembers the Sync Mode setting separately for each digital input. The options are:

Audio – The DAC extracts the clock from the data stream connected to the selected digital input and locks to it. Use this setting for sources that do not have a suitable Word Clock input. This arrangement does NOT give the best jitter performance or the best sound quality. The SDIF-2 and USB inputs cannot be set to Audio Sync.

Master – The DAC uses its own stable clock while the **Word Clock Out**put carries a clock at the same rate as the incoming data, so that the source can lock to the DAC. For correct master mode operation, the source equipment MUST be locked to the DAC. This is the recommended setting if you have a Vivaldi Transport, but not a Vivaldi Clock. The **SDIF-2** input does not support this mode.

Universal Master Mode – This mode is for use with a Vivaldi Upsampler and a computer audio source, where no Master Clock is available. The DAC generates a 38.4kHz clock at the **Word Clock Out**put, which must be connected to one of the Upsampler's **Word Clock In**puts. The Vivaldi Upsampler (v1.10 or later) can lock to the 38.4kHz clock while receiving data at any standard rate.

Note that the Scarlatti and Paganini Upsamplers do not support this mode.

Word Clock 1-2 Auto – This mode is designed for easy operation with a Vivaldi Clock, Upsampler and computer, where the data rate may keep changing. Connect the **Word Clock In1** input to a Clock output set to 44.1 or 88.2 or 176.4kHz and connect the **Word Clock In2** input to a Clock output set to 48, 96 or 192kHz. The Upsampler's Word Clock inputs should be connected similarly. When the sample rate changes, the DAC and Upsampler will automatically select a Word Clock frequency that is synchronous with the data. The selected word clock input is displayed. This mode is not available for the **SDIF-2** input.

Word Clock 1 – The DAC locks to an external clock connected to **Word Clock In1**.

Word Clock 2 – The DAC locks to an external clock connected to **Word Clock In2**.

Word Clock 3 – The DAC locks to an external clock connected to **Word Clock In3**.

If the DAC cannot find a word clock that is synchronous with the data, it will default to Audio sync (or Master mode for the **USB** input) and display the "Bad Clock" icon.

Output Level

Output Level - sets the full scale output level to 2V rms or 6V rms. When you set up your system, choose the Output Level setting that gives a comfortable listening level with the **Volume** set between **–10dB** and **–30dB**. The difference between the two settings is about 10dB.

Dual AES1+2

This setting allows the **AES1** and **AES2** inputs to be used together to accept PCM data at high sample rates (88.2, 96, 176.4, 192, 352.8 or 384kS/s or DSD) from a Dual AES source. Note that a source with two AES outputs might not actually produce Dual AES data! The settings are:

- Off – Dual AES mode is disabled. Both inputs accept single AES data.

- On – Dual AES mode can be manually selected using the **Input** button or the remote control.

- Auto – The unit detects the format flags in the digital data and automatically sets the **AES1** & **2** inputs to Single AES or Dual AES mode as required. This is the usual setting. Note that if the format flag in the data is wrong, you will need to manually select the correct setting.

Dual AES3+4

This page operates in the same way for the **AES3** & **AES4** input pair.

Phase

This page changes the phase of all the analogue outputs from normal phase…

…to inverted phase, to correct for absolute phase errors on recorded music.

Channel Swap

Swaps the channels from normal…

…to swapped to correct a connection error. Correct the error and change back to normal. Channel Swap does not affect the Channel Check feature.

Balance

The operation of the rotary control changes to adjust the balance. Each channel can be varied from 0dB to –6dB in 0.1dB steps, then mute (-∞) below that. **Balance** adjustment ends after this menu page closes or the **Menu** button is pressed. Most owners use the remote control to adjust the balance.

USB Class

Set to Class 1, the **USB** interface will operate with Mac PCs running OSX 10.5 onwards or Windows XP / Vista / Win7 PCs at sample rates up to 96kS/s.

Set to Class 2, the **USB** interface will operate with Mac PCs running OSX 10.6 onwards at sample rates up to 384kS/s. Class 2 operation with Windows PCs requires that the ***dCS*** USB Class 2 Driver (supplied with the unit) is loaded.

After selecting a different USB Class, wait for 10 seconds while the USB software is re-loaded.

Note that the **USB** interface will not be detected by the computer if the unit is set to Class 2 and a suitable driver is not available.

Buffer

Set to On, the digital data is delayed before being presented to the Ring DAC – this is the usual setting. The delay is 0.72 seconds with 44.1kS/s data, falling to 0.16 seconds with 192kS/s data. The delay gives the DAC time to detect changes in sample rate or clock frequency and mute before the change causes audible clicks or other noises.

The extra delay is not a problem with music, but if the DAC is used with television or video, it may cause the sound to be out of sync with the picture. To prevent this, set the Buffer to Off.

EasyPlay

Set to On, if the Vivaldi DAC is connected to the Transport's Dual AES output, the action of loading a disc in the Vivaldi Transport causes the DAC to change input to match the disc type.

If the disc is an SACD, the Dual AES input connected to the Vivaldi Transport is selected.

If the disc is a CD, the data stream sourced from the Transport's PCM outputs is selected in the order:

1. The upsampled AES or Dual AES data from the Vivaldi Upsampler.
2. The upsampled Dual AES data direct from the Vivaldi Transport.

With EasyPlay set to Off, automatic input selection is disabled.

RS232 Mode

This page sets the RS232 interface to either Text mode for use with 3rd-party control systems or…

…dCS production Binary mode, which is intended for factory use only.

CONFIGURATION Menu

Settings Lock

Set to Locked, this icon is displayed and the following settings cannot be changed:

- Sync Mode setting for all inputs
- Output Level
- Dual AES 1&2
- Dual AES 3&4
- Channel Swap
- Balance
- USB Class
- RS232 Mode
- Factory Reset is disabled

Set to Unlocked if you need to change these settings.

Save Configuration

Once the unit is set up the way you want it, select Save to store the settings in memory. If you deliberately change the setup later and want to keep it, select Save again to store the changes.

Restore Configuration

If the unit settings are accidentally changed, select Restore to reload the settings you saved earlier.

Reset Input Names

If the inputs have been renamed from a computer, this page resets them to the original names: **AES1**, **AES2**, etc.

Factory Reset

This page resets the unit to standard settings. These are:

- **Volume** to **–30dB**.
- Balance to centre.
- **Input** to **AES1**.
- Sync to Audio for all inputs, except
- **USB** sync to Master
- **SDIF-2** sync to Word Clock In1
- **Filter** to **1** for all sample rates.
- Dual AES1+2 & 3+4 to Auto.
- Phase to Normal.
- Output Level to 2V.
- Display to On.
- Brightness to maximum.
- RS232 Mode to Binary.
- Channel Swap to Normal.
- Buffer to On.
- EasyPlay to On.

DISPLAY SETTINGS Menu

Brightness

Set the display **Brightness** to a comfortable level using the ◄ or ► buttons.

Display On/Off

This page is usually set to On.

When set to Off and the menu closes, the display will turn off after a few seconds. The display will turn on briefly when a control setting is changed. The display will stay on if the unit is not locked or is muted or while the menu is open.

GENERATOR Menu

Channel Check

A routine to test the system for swapped channels. A tone is output on the left channel only while the display shows **Left**, then the right channel only while the display shows **Right**. If these are the wrong way around, the left and right channels are swapped somewhere in your system. This test is not affected by the Channel Swap menu page setting.

Phase Check

A routine to test the system for phase reversals. Noise is output in phase on both channels while the display shows **In Phase**. Press the **Menu** button, the noise on the right channel is inverted while the display shows **Out of Phase**. The first burst should produce a central image, the second burst should not. If these are the wrong way around, one channel in your system is phase inverted. Press the **Power** button to stop the test and return to the menu.

Burn In

A procedure to condition your system. The unit displays **Burn In Caution! Loud**, then outputs modulated pink noise that ramps up slowly in level. Press any button to stop the procedure.

Please ensure that the volume level is reasonable, as careless use of the Burn In feature can damage your amplifiers and loudspeakers. ***dCS*** will not be liable for such damage.

SPECIFICATION

Converter type	***dCS*** proprietary Ring DAC™ topology.
Digital inputs	4x AES/EBU on 3-pin female XLR connectors. Each will accept up to 24 bit PCM at 32, 44.1, 48, 88.2, 96, 176.4 or 192kS/s or DSD/64 in DoP format, **OR** used as Dual AES pairs at 88.2, 96, 176.4, 192, 352.8 or 384kS/s or encrypted DSD or DSD/64 in DoP format.
	3x SPDIF on 2x RCA Phono and 1x BNC connectors. Each will accept up to 24 bit PCM at 32, 44.1, 48.88.2, 96, 176.4 or 192kS/s or DSD/64 in DoP format.
	1x SPDIF optical on a Toslink connector, will accept up to 24 bit PCM at 32, 44.1, 48, 88.2 or 96kS/s.
	1x SDIF-2 interface on 2x BNC connectors, will accept up to 24 bit PCM at 32, 44.1, 48, 88.2 or 96kS/s or SDIF-2 DSD (auto-selected). This interface requires a compatible word clock connected to one of the **Word Clock In**puts, locked to the data rate.
	USB interface on a B-type connector, will accept up to 24 bit PCM at: • 44.1, 48, 88.2 or 96kS/s when set to USB Class 1 (no driver required). • 44.1, 48, 88.2, 96, 176.4, 192, 352.8 or 384kS/s when set to USB Class 2 (no special driver is required for OSX 10.6 onwards, load the latest dCS USB Class 2 driver for Windows). • Set to USB Class 2, decodes DSD/64 in DoP format. The USB interface operates in true asynchronous USB mode.
Clocking	3x Word Clock Inputs on 3x BNC connector, accept standard word clock at 32, 44.1, 48, 88.2, 96, 176.4 or 192kHz. The data rate can be the same as the clock rate or an exact multiple (0.25x, 0.5x, 1x, 2x, 4x, 8x) of the clock rate. Sensitive to TTL levels.
	Word Clock Output on 1x BNC connector. In Master mode, a TTL-compatible 44.1kHz word clock appears on this output, not temperature compensated. In Universal Master Mode, a TTL-compatible 38.4kHz word clock appears on this output, for connection to the Vivaldi Upsampler.
Frequency response (set to Filter 1)	Fs = 32kS/s: +0.1/-0.5dB, 10Hz to 15kHz Fs = 44.1 or 48kS/s: +/-0.1dB, 10Hz to 20kHz Fs = 88.2 or 96kS/s: +/-0.1dB, 10Hz to 20kHz; -3dB @ >38kHz Fs = 176.4 or 192kS/s: +/-0.1dB, 10Hz to 20kHz; -3dB @ >67kHz Fs = 352.8 or 384kS/s: +/-0.1dB, 10Hz to 20kHz; -3dB @ >100kHz DSD/64: +/-0.1dB, 10Hz to 20kHz; -3dB @ >85kHz
Residual noise	Better than –113dB0 on 6V setting, 20Hz - 20kHz unweighted.
Spurious responses	Better than –105dB0, 20Hz - 20kHz.
L-R crosstalk	Better than –115dB0, 20Hz - 20kHz.
Output levels	2V rms or 6V rms on all outputs for a full-scale input, set in the menu.

Balanced outputs	1 stereo pair on 2x 3-pin male XLR connectors (pin 2 = hot, pin 3 = cold). These outputs are electronically balanced and floating, the signal balance ratio at 1kHz is better than 40dB. Output impedance is 3Ω, maximum load is 600Ω (a 10kΩ - 100kΩ load is recommended).
Unbalanced outputs	1 stereo pair on 2x RCA Phono connectors. Output impedance is 52Ω, maximum load is 600Ω (a 10kΩ - 100kΩ load is recommended).
Size and weight	444mm (17.5”) long x 435mm (17.2”) deep x 151mm (6.0”) high. Allow extra depth for cable connectors. Allow space for air flow around the unit. 16.2kg (35.65lbs).
Power requirements	Internally set to either 100, 115/120, 220 or 230/240V AC, 49 – 62Hz. Power consumption: 23W typical, 30W maximum. Consumes less than 0.5W when powered down from the front panel.

These specifications are subject to change without notice.

MAINTENANCE AND SUPPORT

Service and Maintenance

dCS audio products are designed not to need regular maintenance, and contain no user serviceable parts apart from the mains fuse. If your unit is damaged in any way, please contact your dealer.

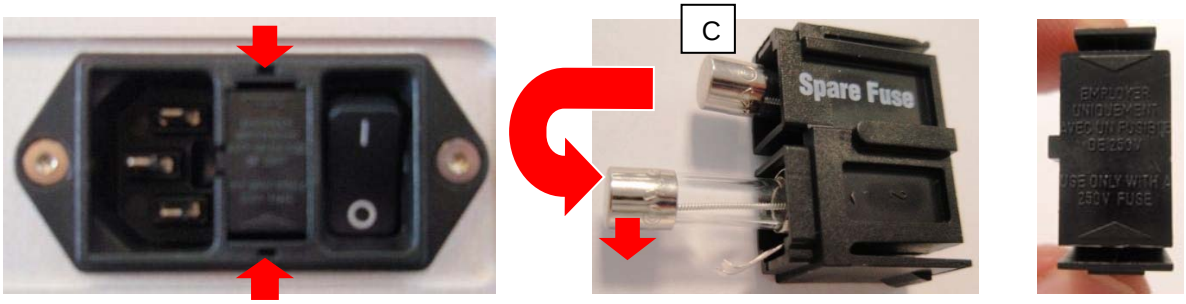
Replacing a Blown Mains Fuse

There is a mains fuse below the power inlet, accessible from the outside of the unit. If the fuse blows, it may be changed by the user. The current consumption of the unit is very low, so it only blows if power surges occur, or there is a fault in the unit. Usually power surges cause no other damage, but if the fuse blows repeatedly on replacement, some other damage will have been done and the unit must be returned to ***dCS*** for repair.

Fuse type: 20 x 5mm T 1 amp L fuse

If the fuse should fail, it is essential that it is replaced with one of the same type and rating. Failure to do so could result in damage to the unit, risk of fire or electric shock and will invalidate the warranty. Fuse failure is rare!

Referring to the diagram below, remove the power cable, use your fingernails to catch the two tabs of the fuse holder (A), push them together to release the clips and pull the fuse holder out. Pull out the blown fuse from the lower position (B) and discard it. Either move the Spare Fuse (C) to the lower position or fit one of the fuses from the manual pack. Orient the fuse holder as shown (D) and push the holder back into the power inlet so that it clicks home.



A B D

Cleaning the case

The front and back panels of your ***dCS*** equipment are machined from very high grade aluminium. Great care has been taken to create the finish of the aluminium throughout the engineering process from the raw solid material to the finished piece.

To remove loose dust or finger marks from the case, we recommend that you use a clean, dry, lint-free cloth.

To restore the finish, we recommend applying small quantities of a lanolin based cleaner, using a clean, dry, lint-free cloth and then wiping off. Do not allow lanolin to collect around the buttons.

Small amounts of glass cleaner containing ammonia may be used to clean other surfaces, but avoid spraying onto the connector contacts.

Limited Warranty

General

dCS warrants this product against defects in materials and workmanship for a period of 3 years from the date the unit was originally shipped from ***dCS***. If the product is purchased and registered with ***dCS*** within 6 months of the date the unit was originally shipped from ***dCS***, we will start the warranty on the purchase date. For units registered later than 6 months from the ship date, we will start the warranty from the ship date unless the registration is supported by the original sales invoice. During the warranty period, ***dCS*** will repair or, at our absolute discretion, replace a faulty product. Warranty repairs must only be carried out by ***dCS*** or our authorised service agents. Please contact your dealer if your unit requires service.

To register this product, either register online at www.dcsltd.co.uk or complete the **Product Registration** form within 30 days of the sale and return it to ***dCS***. On receipt of the registration, ***dCS*** will add your contact details to our customer database. ***dCS*** will use this information for warranty purposes only, we will not contact you directly for reasons relating to sales and marketing.

This warranty applies to the original owner, it is not transferable.

Warranty Exclusions

The Warranty does not cover wear and tear.

The Warranty on this product will be void if:

- the product is misused in any way.
- any unauthorised modifications or repairs are carried out.
- the product is not used in accordance with the Operating Conditions stated in this manual**.**
- the product is serviced or repaired other than by ***dCS*** or our authorised service agents.
- the product is operated without a mains earth (or ground) connection.
- the unit is returned inadequately packed.

dCS reserve the right to apply a service charge if a product returned for warranty repair is found to be operating correctly, or if a product is returned without a returns number being issued.

This warranty covers parts and labour only, it does not cover shipping charges or tax/duty.

Our dealers or distributors are NOT authorised to extend the terms of this warranty, ***dCS*** cannot accept responsibility for any attempt to do so.

Products re-sold by ***dCS*** on a “used” basis may be subject to reduced warranty terms.

Obtaining Service

Should you encounter a problem, contact your authorised ***dCS*** dealer for advice, quoting the model, the full serial number, software version number, and giving a detailed description of the fault. Your dealer will advise you fully on actions that need to be taken. When returning a unit, the original packaging should be used to avoid transit damage. Replacement packaging sets may be purchased from ***dCS.***

During the Warranty period, there will normally be no charge for parts or labour.

Operating Conditions

- The supply voltage must remain within +/-10% of the A.C. voltage specified on the back panel.
- The supply frequency must be in the range 49Hz to 62Hz.
- Ambient temperature range: 0°C (32°F) to 40°C (104°F), non-condensing.
- Do not install the unit near heat sources such as radiators, air ducts, power amplifiers or direct strong sunlight.
- If in doubt, the easy test is – the unit is happy to work anywhere a human is.

If you need more help

In the first instance, you should contact your dealer. If they cannot resolve the issue, contact your national distributor.

Manufactured by:

Data Conversion Systems Ltd.
Unit 1, Buckingway Business Park,
Anderson Road,
Swavesey,
Cambridgeshire. CB24 4AE
UK

www.dcsltd.co.uk

This user manual may be downloaded free of charge from our web-site.

A bound copy of this manual may be ordered from ***dCS***.

Software History

dCS products make extensive use of software configurable chips – FPGAs and DSPs. This gives us the ability to update our products to add extra features, update digital interface standards or make performance improvements by loading new software. Occasionally, a hardware upgrade may be necessary also to increase the "capacity" of the electronics, add extra connectors or extra front panel controls.

Please note that not all software updates produce an audible improvement. We recommend that you keep your software up to date. Check the ***dCS*** web-site occasionally for news of the latest software updates.

Update discs are available from our distributors. Before requesting an update disc, please open the Info > Version menu page and check the Control Board version to verify that an update is actually needed.

This manual is for ***Vivaldi DAC*** software version 1.2x.

Issue 1.00	The first issue.
Issue 1.01	Reliability improvement.
Issue 1.02	Enhanced functionality of "tunnel" commands for App support. RS232 commands added for Sleep, Mute, Output Level and Volume.
Issue 1.10	Configuration menu added, with Settings Lock, Save & Restore Configuration. Buffer and EasyPlay features added to the Settings menu. Inputs that are not connected and active cannot be selected. The USB input accepts 24-bit data at 352.8 and 384kS/s. Universal Master Mode added. The DAC Mutes the outputs when the Non-Audio flag is set in the incoming data. RS232 commands added for Set Sync Mode, set Balance, report Balance setting. Filter settings for 176.4 & 192kS/s are stored correctly at switch off. Performance at 32kS/s corrected. Various minor bugs fixed.
Issue 1.20	When the Non Audio flag is displayed, changing the volume causes the volume display to reappear momentarily. The volume setting behaves correctly when the unit is muted and the volume is changed. More RS232 Text mode commands have been added. The unit will re-lock when the second cable of a Dual AES pair is connected.

INDEX

A

AES input 10, 23

B

balance 31
buffer 32
burn in 34

C

cables 7
channel check 34
channel swap 31
cleaning 37
configuration
  restore 33
  save 33
configuration menu 33
contact 29

D

display 20
display brightness 34
display menu 34
display off 34
Dual AES 31
Dual AES input 9, 23

E

easyplay 32

F

feet 5
filter button 21
front panel 20
full system 17
fuse, replacing 37

G

generator menu 34

I

information menu 29
input
  AES 10, 23
  Dual AES 9, 23
  SDIF-2 ..... 10, 24
  SPDIF 10, 24
  Toslink 24
  USB 11, 24
  word clock 10, 16, 25
input button 22
input selection 9

L

lock 33

M

mains inlet 25
master clock 16
master mode 30
menu 27
  configuration 33
  display 34
  generator 34
  information 29
  settings 30
  using 28
menu back button 21
menu button 21
menu forward button 22
mute button 22

O

operating conditions 38
output 23
  analogue 14, 23
  word clock 15, 25
output level 14, 30

P

PC setup 12
phase 31
phase check 34
positioning 5
power button 21
Power off 21
power up 7
preamplifier 14

R

rear panel 23
remote control 20, 26
  batteries 8
rename inputs 19
reset 33
reset input names 33
restore configuration 33
RS232 ..... 25, 32

S

safety 6
save configuration 33
SDIF-2 input 10, 24
serial number 25
service 37
settings menu 30
setup guide 7
sleep 21
software 29, 39
SPDIF input 10, 24
specification 35
status 29
sync mode 15, 30

T

Toslink input 24

U

universal master 30
update 29, 39
USB 31
  class 11
  Windows driver 11
USB input 11, 24

V

voltage 25
volume control 22

W

wake 21
warranty 38
word clock 25, 30